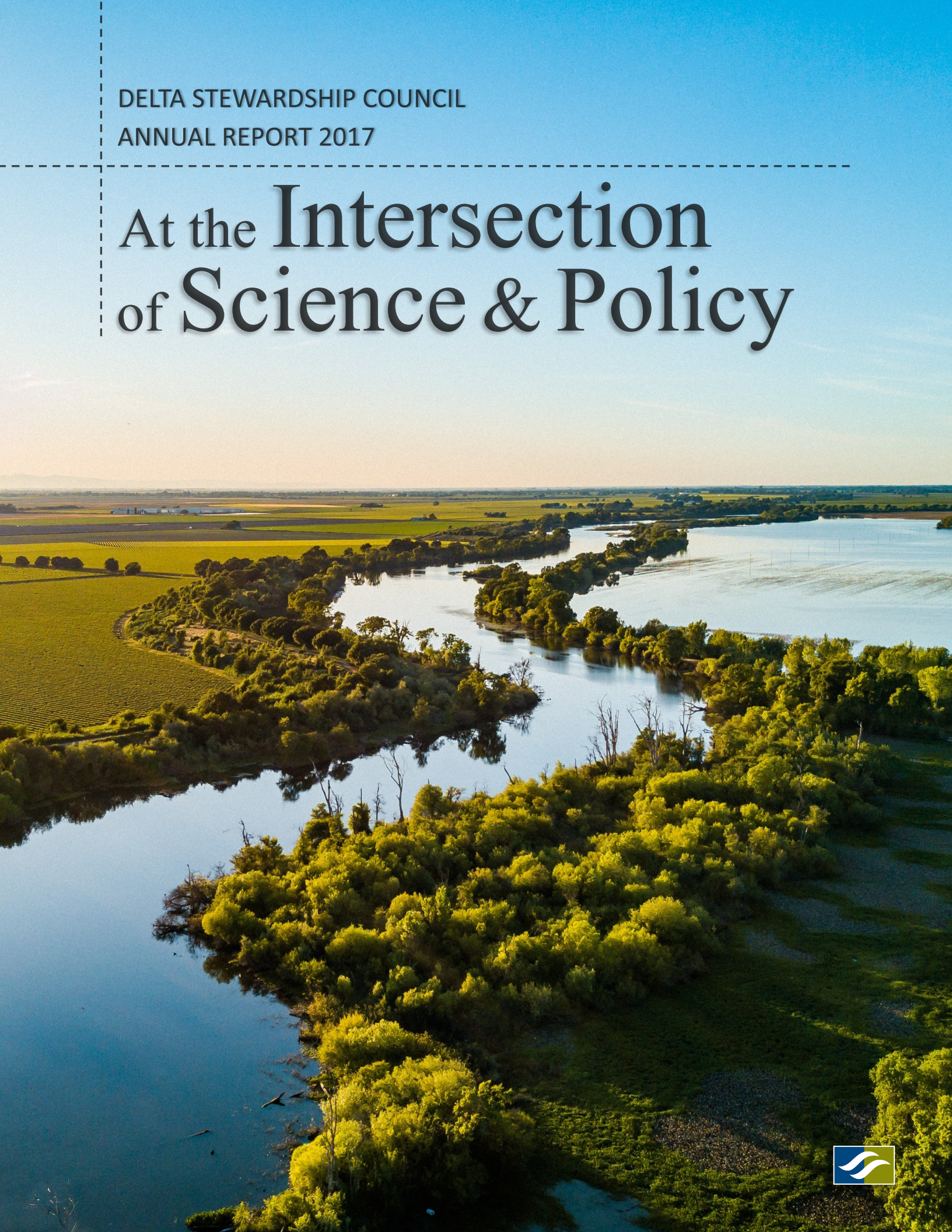
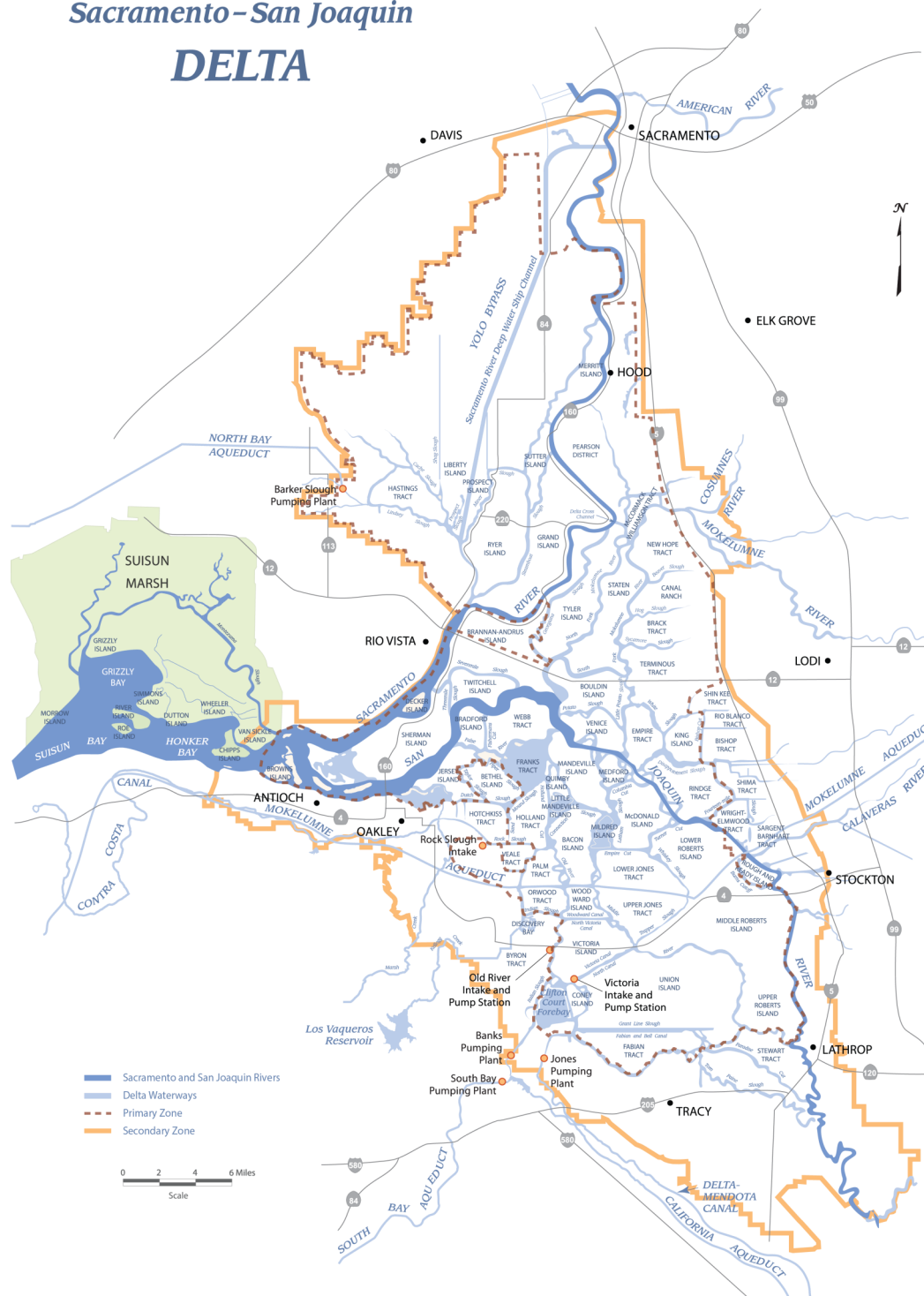


DELTA STEWARDSHIP COUNCIL
ANNUAL REPORT 2017

At the Intersection of Science & Policy



Sacramento-San Joaquin
DELTA



Contents

Message From the Executive Officer	4
The Council: Charting a Course for the Future	6
2017 Timeline	10
Making Science Understandable and Accessible.....	12
Establishing Best Practices After the Drought	18
Restoration Progress: Planning and Permitting	22
Understanding, Preserving, and Marketing Delta’s Heritage	25
Using Science and Experience to Manage Flood Risk.....	28
2018 Council Priorities	31

Forward

The [Delta Stewardship Council](#) (Council) made a significant push in 2017 to engage with its Sacramento-San Joaquin River Delta (Delta) community via social media to increase awareness of the agency’s purpose and role. Between [Twitter](#) and [Instagram](#), those efforts brought the Council nearly 1,000 new followers— not to mention an abundance of photos, many of which are placed throughout this report.

The Council is honored to feature the photographic work of [Francisco Chavira](#), a talented photographer based in Northern California, on its front cover as well as in the message from Executive Officer Jessica Pearson and the 2017 timeline. The back cover of this document features a portrait, taken by State Fellow Heidi Williams, of Senior Environmental Planner Kate Anderson enjoying a staff field trip on Staten Island. These images and more represent the thousands of social media pictures and accounts that the Council engaged with in 2017. Unless otherwise noted, photos in this report are courtesy of the [Department of Water Resources](#) (DWR).

With gratitude, the Council extends special thanks to the photographers who generously contributed to this year’s Annual Report, as their work colorfully depicts the many highlights, actions, and progressions achieved across the Delta in 2017.

The Delta is a stunningly beautiful part of California. We are proud to feature its beauty.



Jessica R. Pearson,
Executive Officer

In a world where change — especially climate change— is a constant, the ability to bring the best available science to bear on policy decisions and adaptively manage resulting projects is more important than ever.

Does California still need a Delta Plan?

In a world where change - especially climate change - is a constant, the ability to bring the best available science to bear on policy decisions and adaptively manage resulting projects is more important than ever.

The Delta Stewardship Council was formed to be an independent voice for both science and policy in the Delta and Suisun Marsh, a long-embattled part of California that is critical to both its statewide water supply and its environment.

The Council's [Delta Plan](#) is the State's only enforceable long-term management plan for the Delta. It puts into place strategies and requirements to:

- Base policy and projects on the best available science,
- Reduce reliance on water exported from the Delta while increasing water supply reliability through supply diversification,
- Prevent harm and improve the health of the Delta's ecosystem through interconnected restoration and multiple benefit projects,
- Reduce risk in one of the nation's most flood-prone areas through sensible land-use policies and strategic investments in Delta levees, and
- Enhance the Delta's sense of place through community development and marketing strategies as well as requiring elevated levels of mitigation for the effects of government projects.

The Council supports this Delta Plan through investments in science investigations, encouragement of innovative approaches to ecosystem restoration and water supply strategies, development of data-driven programs such as the [Decision Support Tool](#) for levee investments, and by proactive and transparent coordination and decision-making among the State, local, and federal agencies working in the Delta.

Without a Delta Plan there would be no State-level protection against urbanization of farmland and high-priority habitat areas in the Secondary Zone of the Delta; no special protections for the lands that hold the greatest future restoration value throughout the Delta, no checks on major State or local infrastructure projects being constructed in the Delta, and limited recourse (outside of the courts) for projects pursued in the Delta that are inconsistent with State goals and policies.

Without a [Delta Science Plan](#), we run the risk that investments in science would not

necessarily align with management needs, agencies might duplicate efforts and useable science might arrive after critical decisions have been made.

Under the Council's leadership, and with both plans in place, however, there was a flurry of coordinated Delta activity this year: projects breaking ground and nearing final planning through [California EcoRestore](#) (EcoRestore), Delta conveyance improvements nearing final approval through [California WaterFix](#) (WaterFix), investments in flood protection and an update of the [Central Valley Flood Protection Plan](#) (CVFPP), local governments updating general plans and making decisions that affect the landscape of the Delta, major decisions regarding water flow and Delta operations at the [California State Water Resources Control Board](#) (Water Board), and major improvements in our understanding of smelt, salmon, and food web issues.

The Council also publicly developed a set of amendments to the Delta Plan – 1) to better guide future investments in Delta levees and risk reduction, 2) to improve the way water is moved across the Delta in coordination with increased storage and improved operations, and 3) to refine performance measures that will adequately and accurately address outcomes as well as dollars spent and projects completed.

In California, change is always right around the corner, be it the next drought or flood, the long-term diminishing of the Sierra snowpack, the warming of Delta waters, the rising sea levels increasing pressure on Delta levees, and ever growing demands on Delta resources.

With the Delta Plan in place, the Council – together with its implementing partner agencies – stands ready to learn, adapt, and lead through this changing future.

Does California still need a Delta Plan? More than ever.



(Aerial photo of Twin Cities Road Bridge by Francisco Chavira)

The Council: Charting a Consistent Course

Covered actions ensure consistency across many agencies

Delta Plan amendments keep pace with changed circumstances

Accessible data will support meaningful performance measures



The Council was established in 2010 with a primary mission to achieve the State's "[coequal goals](#)" for the Delta: providing a more reliable water supply for California while protecting and restoring the Delta's ecosystem, both achieved in a manner that respects and enhances the Delta's unique character. The Council's chief tool, the Delta Plan, was required by the [Legislature](#) to be a legally enforceable long-term management plan for the Delta and the Suisun Marsh. It was adopted in 2013 and is administered by the Council, an independent State agency with a seven-member appointed board.

The Council works to achieve the coequal goals through everyday actions that support implementation of the Delta Plan. We use a formal [covered action](#) consistency review process, as well as monthly public Council meetings to ensure actions are consistent with the Delta Plan's [14 regulations](#) and 73 recommendations. But we also work collaboratively with local, State, and federal agencies, Delta residents, and non-governmental organizations to ensure that plans and actions are consistent with the Delta Plan's regulations and recommendations.

Implementing the Delta Plan



Consultation and coordination efforts occur on a range of topics including risk reduction, regional self-reliance for water supply, water storage, protections and enhancements for the Delta's recreational and agricultural economy, and ecosystem restoration. They also occur for specific projects or programs that affect the management of water supply, ecosystem, or flood control. Collectively these regulations provide important Delta protections that would not otherwise exist.

The Council has statutory authority to require that State and local agencies certify that their plans, programs, and/or projects are consistent with the Delta Plan. This includes informal staff-level discussions with project proponents – "early consultations" – that assist them in determining their required consistency with the Delta Plan's 14 regulatory policies, as the law intended.

This year, certifications were filed with the Council for a restoration project on Decker Island, a levee rehabilitation project on Bacon Island, and a research center in Rio Vista.

- The [Decker Island Project](#) is located along the Sacramento River in Solano County, and is currently an emergent wetland with some tidal connectivity. The project

proposes to enhance up to 140 acres of tidal wetland, associated high marsh, and riparian habitats to benefit special status species like Delta smelt and Swainson's hawk. By lowering a section of levee, reconfiguring internal berms, and excavating a southern breach, the project will increase site water levels and flow, increase access for fish, inhibit the establishment of invasive vegetation, and enhance access to upland habitat.

- The [Bacon Island Project](#) proposes to rehabilitate 4.7 miles of levee along the western side of Bacon Island to meet Habitat Management Plan cross-section criteria, including a toe berm, wider levee crown, and all-weather access roads. Waterside work will armor new fill material and will be conducted above the mean high water level. The project will also plant native grasses on the levee and includes a monitoring and management plan based on [California Department of Fish and Wildlife](#) (DFW) and DWR guidelines.
- The [Estuarine Research Station](#) would be constructed on the site of the decommissioned City of Rio Vista Army Base and include 116,000 square feet of buildings, an open storage yard, and a marina for approximately 23 vessels. The station aims to bring ongoing research and monitoring activities for the San Francisco Bay and the Delta to a single, riverfront location. The majority of the station would be outside of both the primary and secondary Delta, with only the marina component extending into the Primary Delta.

In addition to the three certifications, 14 projects went through early consultation, and the Council provided 23 formal comment letters intended to ensure that projects not subject to the Council's direct oversight are nonetheless aware of the Delta Plan's requirements and how they could further the coequal goals.

Amending the Delta Plan

Adopted by the Council in May 2013, the Delta Plan anticipated the need for periodic reviews and updates in response to changing circumstances and conditions in the Delta unrelated to the [Water Code section 85300\(c\)](#) requirement that the Council review the entire Delta Plan no less than once every five years.

The primary focus of the Council this year has been to develop three amendments, two of which were called for in the original Delta Plan and one that was triggered by changing circumstances. All three are summarized below.

[Delta Levees Investment Strategy \(DLIS\)](#) – The amendment includes a suite of recommendations and one potential regulation that address flood management and ecosystem restoration. Together they seek to reduce risk to people, property, and State interests in the Delta by promoting strategic levee investments in levee operation, maintenance, and improvements; strategic land use planning; non-structural risk reduction; effective emergency preparedness and response; updating funding strategies; and engaging the federal government in disaster recovery, through strategic public investment, increased protection of floodways and floodplains and programs to reduce the consequences of floods in the Delta.



A former Army base in Rio Vista, unused since 1995, will be home to a new Estuarine Research Station, centering ongoing research and monitoring activities in the Delta.



This year, several output and outcome PM were further refined in response to public input received during development of the DLIS and the CSO amendments.

Conveyance, Storage, & Operations (CSO) – In April 2015, the [Brown Administration](#) announced a new preferred alternative to the [Bay-Delta Conservation Plan](#) (BDCP) that would not complete it as a [Natural Community Conservation Plan](#) (NCCP), but instead construct water conveyance facilities through an initiative called California WaterFix.

This action triggered a provision in the Council’s Delta Plan to reexamine its recommendations and policies to address the way water is transferred across the Delta. Since then, the Council has worked to develop an amendment to the Delta Plan to promote conveyance options and better integrate new storage opportunities and improved operations.

The proposed amendment promotes options for new and improved water conveyance including new diversion and conveyance facilities along with fish screening and other related facilities; new and expanded storage, including surface water storage, onstream or offstream reservoirs, and groundwater storage, recharge, and recovery facilities.

Performance Measures (PM) – When adopted by the Council in May 2013, the Delta Plan included an initial suite of PM organized by Delta Plan goal and strategy. The Plan called for these measures to be refined through a multiyear, stakeholder-inclusive effort with special emphasis on “outcome” and “output” measures and included in subsequent updates of the Delta Plan.

Over the next three years, the Council began that multiyear effort to refine the initial output and outcome PM, based on best available science and information from stakeholders. Following a review by the [Delta Independent Science Board](#) (Delta ISB), the Council adopted 37 output and outcome PM in February 2016 as an amendment to the Delta Plan. This year, several output and outcome PM were further refined in response to public input received during development of the DLIS and the CSO amendments, and are now undergoing environmental review.

In addition, the [California Environmental Quality Act](#) (CEQA) generally requires a government agency to evaluate and consider the potential significant adverse environmental consequences of a proposed action before the agency takes the action. At year’s end, the proposed Delta Plan amendments were evaluated through a [Program Environmental Impact Report](#) (PEIR), with certification of the PEIR and adoption of the amendments anticipated in early 2018.

Improving Access to Data Across Agencies

To effectively measure progress, the Council’s PM require access to open and transparent data across multiple agencies. In 2014, the Council’s [Delta Science Program](#) hosted a data summit that resulted in a white paper outlining key principles. In 2016, the Legislature passed the [Open and Transparent Water Data Act](#) (Data Act), which was largely based on these principles, including:

- Establishing a new governance framework that could facilitate broader decisions and standards regarding the State’s environmental data management;
- Enhancing data transparency;



Delta residents make the Council aware of their concerns over one particular water conveyance proposal during discussions on amending the Delta Plan. (Council photo)

- Providing clear and careful documentation of data quality and data formats; and
- Developing business models that foster sustained, incremental investment, and partnership with nongovernmental partners.

This year, the Council began work with a number of State agencies to undertake implementation of the Data Act, including an “Open Data Handbook” expected in early 2018, and development of a data access platform.

Coordinating the Delta Plan

The [Delta Plan Interagency Implementation Committee](#) (DPIIC) serves as a forum to discuss, consider, and orchestrate the timely and coordinated implementation of actions that further the coequal goals consistent with the Delta Plan and with the annual priorities set by the Council. Comprised of the leaders from 17 State, federal and regional agencies, the DPIIC has priority-focused discussions to identify where consensus-based action can improve ecosystem management, especially as it pertains to supporting decision-making with best-available science, and support Gov. Jerry Brown’s [California Water Action Plan](#).

The DPIIC, which met in April and November 2017, helps maintain accountability through coordinated actions and progress updates covering multiple programs, plans, and projects being carried out by the more than 225 State, federal and local agencies with some degree of jurisdiction in the Delta. The focus this year was on advancing important Delta science actions and coordination among key agencies on ecosystem restoration, and creating opportunities where problems seem particularly intractable.

The Delta Plan Interagency Implementation Committee meets in West Sacramento. (Council photo)



20

JAN.

Funding aimed to restore Delta ecosystems — CDFW awarded \$7.2M in Prop 1 funds for projects that improve ecological conditions for native fish and wildlife in the Delta.

State Senate confirmed Governor Brown's reappointment of Randy Fiorini as Council member; he continues as chair of the Council. Solano County Supervisor **Skip Thomson** became a Council member as chair of the Delta Protection Commission.



FEB.

Strategy Ensured Delta's Economic Sustainability — Delta Conservancy released a locally driven five-year marketing strategy for Delta tourism.

Assembly speaker appointed **Mike Gatto** as Council member replacing Aja Brown, who resigned at the end of 2016.



MAR.

Science Enterprise Workshop Report combined information found in the Science Enterprise Workshop Advance Briefing Papers.

Public workshops for proposed Delta Plan amendments for Conveyance, Storage, and Operations and Performance Measures were held to provide information on water supply, the Delta's ecosystem, reducing risk, and more.



APR.

Gov. Brown lifted drought emergency and promoted conservation — Administration released plan to prepare for future droughts and make conservation a way of life for Californians.

Delta Plan Interagency Implementation Committee met to discuss 2017 priorities, EcoRestore, habitat restoration, a pilot-study on integrated ecosystem modeling, and more.



MAY

Launch of State of Bay-Delta Science 2016 Interactive Webpage offered more depth and clarity of the related materials and the summary of policies document.

The Council shared its 2,000th tweet!



JUN.

California Natural Resources Agency released science-based strategy to address needs of Sacramento Valley salmon and steelhead.

Flood risk reduction and ecosystem restoration — DWR began construction of Southport Levee Setback and continued to design Lower Elkhorn Basin Levee Setback to reduce flood risk and restore ecosystems as part of EcoRestore.



17



Photo by Francisco Chavira

Dr. John Callaway appointed as Lead Scientist of Delta Science Program.

The Council accepted drafted 2017-2021 Science Action Agenda



to prioritize and align science actions to inform management decisions, fill gaps in knowledge, promote collaborative science, build the science infrastructure, and achieve the objective of the Delta Science Plan.

DWR developed and Central Valley Flood Protection Board adopted the 2017 Central Valley Flood Protection Plan update.

Water Storage Investment Program received 12 applications seeking \$5.79B, twice the amount of funds available in 2018.



Flood Management Association honored the Delta Levees Investment Strategy for advancing collective goals and objectives in floodplain management and flood protection.

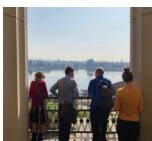
Council met with Haihe River Water Conservancy Commission from China to discuss water management and ecosystem restoration issues related to the Haihe River watershed in China as well as the Delta.



Collaborative road map for Delta science released — The Council released 2017-2021 Science Action Agenda to prioritize and align science actions for achieving Delta Science Plan objectives.

State of the Estuary Conference focused on the management and ecological health of the San Francisco Bay-Delta Estuary.

Launch of Science Action Agenda interactive webpage offered more depth and clarity of the 13 Delta science actions and management needs.



New Water Year began after record-breaking Water Year 2017, that ended California's five-year drought.

Delta Plan Interagency Implementation Committee met to discuss the desired future and vision for Delta restoration and recovery.



Permanent regulations prohibited wasteful water use — Water Board initiated regulatory process to make prohibitions on wastewater water-use practices permanent.

Long-term Operations Biological Opinions Science Review informed NMFS and USFWS of prior years' water operations and regulatory actions prescribed by their RPA actions.



Yolo Bypass Floodplain Restoration hit milestone as DWR and USBR prepared draft environmental documents to restore 17,000 acres of floodplain habitat, the largest project of its kind in Central Valley.

JULY

AUG.

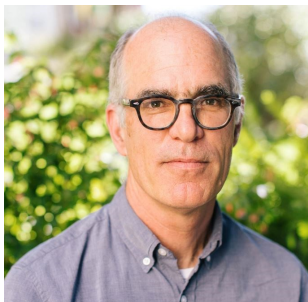
SEPT.

OCT.

NOV.

DEC.

Making Science Understandable and Accessible



John Callaway, new lead scientist

The Council appointed a lead scientist to provide overall direction of the Delta Science Program. This year the Council appointed **Dr. John Callaway**, an internationally recognized expert in wetland restoration, specifically wetland plant ecology and sediment dynamics, to succeed **Dr. Cliff Dahm**, who retired.

The Council also appointed the members of the Delta ISB, who are nationally prominent scientists with appropriate expertise to provide oversight of the scientific research, monitoring, and assessment programs that support adaptive management of the Delta. This year, the Council appointed **Dr. Thomas Holzer**, an emeritus scientist at the [U.S. Geological Survey](#) (USGS), to replace **Dr. Brian Atwater**, who retired.

Updated Science Action Agenda promotes collaboration

Improvements to our understanding of nutrients in the Delta

Forums help integrate science at all levels of policy making

The [Delta Reform Act](#) requires that the Delta Plan be based on, and implemented, using the best available science, with the use of science-based, transparent, and formal adaptive management strategies for ecosystem restoration and water management decisions.

Housed within the Council, the Delta Science Program works to ensure that unbiased, relevant, authoritative science is integrated across State and federal agencies and the scientific community. The Council works to ensure that this science is shared with – and used by – decision-makers, agency managers, stakeholders, and the public.

To do this, the Council adopted a Delta Science Plan to guide efficient use of resources, balancing investments to address short-term (5-10 years) science needs and those that build understanding over the longer term. This Plan lays out strategies for addressing uncertainty and conflicting scientific information, the prioritization of research, near-term science needs, and financial needs to support Delta science.

The Delta Science Plan works to enact a vision of ‘One Delta, One Science,’ meaning an open and integrated Delta science community that works together to build a shared base of knowledge with the capacity to adapt and inform current and future water and environmental decisions in the Delta.

Developed in consultation with agencies, academics, and stakeholders, the Delta Science Plan – like the Council’s Delta Plan – is implemented by multiple agencies and institutions. In this, the Council takes a synthesizing and coordinating role, gathering the right people to work on the right issues and facilitating independent peer review to enhance the reliability of scientific work among different agencies and programs.

Like the Delta Plan itself, the Delta Science Plan is periodically reviewed and updated to keep pace with changing circumstances and the best available science. That process will take place in 2018.

Science Action Agenda Completed

This year, the Delta Science Program completed a five-year [Science Action Agenda](#) (SAA), which prioritizes and aligns science actions to inform management decisions, fills gaps in knowledge, promotes collaborative science, builds the science infrastructure, and achieves the objectives of the Delta Science Plan. The 13 priority science actions presented in the document fill critical knowledge gaps and provide “glue” for bringing the Delta science enterprise together to advance the One Delta, One Science vision of the Delta Science Plan.

The priority actions are organized into five thematic science action areas:

- Invest in assessing the human dimensions of natural resource management decisions;
- Capitalize on existing data through increasing science synthesis;
- Develop tools and methods to support and evaluate habitat restoration;
- Improve understanding of interactions between stressors and managed species and their communities; and
- Modernize monitoring, data management, and modeling.

In the words of former Delta Lead Scientist Cliff Dahm, “The Science Action Agenda for the Delta represents a road map that can help us come together around a common set of priorities no single organization has the capacity to achieve on its own.”

Key Science Actions in 2017

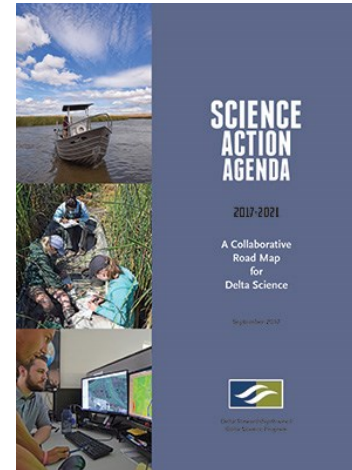
Committee on Grand Challenges and Opportunities — The Council is one of the sponsors of a new study by the National Academy of Sciences, Engineering, and Medicine on Grand Challenges and Opportunities in Environmental Engineering and Science for the 21st Century. The study committee is made up of 18 preeminent scientists and engineers with expertise in environmental engineering, environmental science, or a closely allied field of study. Four of the study committee members have strong California ties.

The committee’s goal is to address how the fields of environmental engineering and science, including education and training of the next generation of practitioners, might need to evolve to better meet the identified grand challenges. The final product from the committee will be a report similar in form to the high impact National Academy of Engineering Grand Challenges for Engineering issued in 2008.

Constituents of Emerging Concern and Aquatic Ecosystem Monitoring — This two-day workshop was co-sponsored by the Delta Science Program and presented the most recent information regarding contaminants of emerging concern (CEC) in the Bay-Delta and other areas of California. CECs are chemicals, such as personal care products and pharmaceuticals, that are not regularly monitored but may have the potential to have adverse ecological and/or human effects.

The workshop was a response to a pilot plan developed by the Water Board for a comprehensive statewide CEC monitoring effort to provide baseline information to help guide management actions. The purpose of the workshop was to provide information to guide the proposed monitoring studies for wastewater and stormwater in the Delta.

The **Central Valley Regional Water Quality Control Board**, with input from stakeholders, will be developing a pilot CEC monitoring study with a focus on wastewater and stormwater agencies in the Delta. Information gathered from these efforts will be used to inform the aforementioned statewide monitoring approach.



The Science Action Agenda is one element of a three-part Delta Science Strategy that includes the Delta Science Plan and the [State of Bay-Delta Science](#).

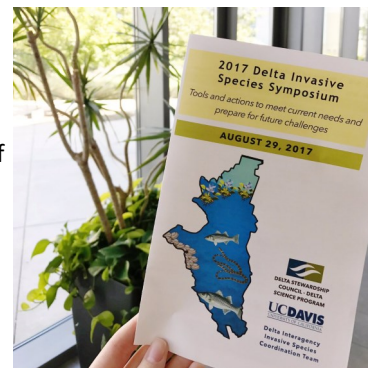
The Delta Science Program hosted the first Delta-specific symposium on both aquatic and terrestrial invasive species, a follow-up to the 2015 symposium on invasive aquatic plants.

Delta Regional Monitoring Program Monitoring Design Phase II — The Delta Science Program convened a panel of independent scientists to [review the scientific quality of the Delta Regional Monitoring Program Monitoring Design](#) over two phases.

The panel's [final report](#) emphasizes the importance of employing expert statistical input in developing the monitoring program design. It also provides recommendations for strengthening design rationales for the four priority constituents to be monitored (pesticides and toxicity, mercury, pathogens, and nutrients), and presents opportunities to improve linkages between core management questions and questions being addressed by the monitoring program.

Delta Invasive Species Symposium — In conjunction with the [Delta Interagency Invasive Species Coordination Team](#) and [University of California, Davis](#) (UC Davis), the Delta Science Program hosted the first Delta-specific symposium on both aquatic and terrestrial invasive species, a follow-up to the 2015 symposium on invasive aquatic plants that was also supported by the Delta Science Program.

Topics ranged from updates on species-specific eradication efforts, general overviews of why the Delta has played host to such an incredible number of invasive species, and tools and techniques for managing invasive species. The symposium concluded with a panel discussion on the human dimension of invasive species management and touched on some pressing questions such as, “How do we live with invasive species?” Additionally, the panel discussed the impacts of increased species invasions with the advent of climate change, including potential management responses.



Understanding Landscape-Scale Change in Primary Production — The Council, in cooperation with the [San Francisco Estuary Institute](#) (SFEI), convened a forum to consider and discuss how the conversion of energy, such as sunlight into biomass via processes like photosynthesis, has shifted in the Delta from predominantly historical marshes and wetlands to open-water (one of the best bass-fishing “lakes” in the nation) and crop land. Whether this shift has produced a food shortage for fish communities in the Delta is a question of substantive debate and both science and management interest. This forum discussed the opportunities to address this topic more quantitatively using the historical ecology studies from SFEI and current research on food webs and hydrologic transport.

Starting with a workshop in October 2015, supported by the Council, Delta Science Program, and USGS, the 2017 forum was an opportunity to discuss the science strategy with managers, agency scientists, and restoration practitioners to identify future analysis to be supported in 2018.

Understanding the Role of Nutrients in Delta Water Quality

The Sacramento and San Joaquin Rivers annually supply a major portion of the nutrients to the Delta. Sources of nutrients include natural sources, fertilizers, and municipal discharge. The abundance of both nitrate (an inorganic form of nitrogen) and phosphorous in river water are seasonally dependent. The highest concentration of nitrate is found during winter months (when there is increased runoff), and maximum phosphorous concentrations are found in the fall (when more sediment is mobilized and transported to the Delta). Nutrient levels often decrease once they enter the Delta.

Much of the Delta's open water has been termed a "high-nutrient, low-growth" environment, where there is generally low phytoplankton biomass despite high levels of nutrients. Waters of the Delta, however, have become increasingly clear in recent decades and algal blooms are increasingly occurring when the right conditions are met. These blooms include both blooms of desirable forms of algae (e.g. diatoms) and nuisance species (e.g. cyanobacteria). The roles of nutrients in both desirable

and harmful algal blooms (HABs) are important areas of ongoing research.

High levels of nutrients, when Delta water temperatures are warm, days are long and clear, and water residence time is long, contribute to the formation of HABs in the Delta. As blooms of harmful cyanobacteria "die" their decomposition can cause conditions that can not only deplete oxygen in the water but also produce harmful toxins that pose a risk to both wildlife and humans. There may also be an economic impact of HABs because their toxic byproducts are costly to treat and may affect recreational tourism.

The spread of invasive aquatic vegetation, such as Brazilian waterweed, water hyacinth, and water primrose, is another pathway by which nutrients might be playing a role in Delta water quality. These non-native species greatly impact the use of waterways for commerce and recreation, alter aquatic habitat, and negatively impact many native Delta species by affecting the availability of crucial food resources.

Operation Baseline

Beginning in 2019, the [Sacramento Regional Wastewater Treatment Plant](#) will undergo \$1.6 billion in upgrades. These upgrades, expected to be completed in 2021, will dramatically reduce total nitrogen levels and alter the chemical form of nitrogen in the Sacramento River. To understand what effects these changes will have on the Delta ecosystem, the Delta Science Program led efforts this year to establish a baseline of chemical and biological conditions prior to treatment upgrades through a set of innovative pilot studies known as "[Operation Baseline](#)".

The studies will assess the current state of nutrients, aquatic vegetation, and the food web in areas that will be affected by the improvements to the wastewater treatment plant. These studies lay the groundwork for enabling comparisons between present and future conditions, including shifts in HABs and excessive growth of aquatic plants.



Sampling for Operation Baseline began this year, including the collection of a wide range of environmental data, from water chemistry to the food web. The initial phase of Operation Baseline will also test new equipment to continuously measure ammonia and phytoplankton community composition along the Sacramento River. Isotopic analyses will inform how nutrients can be traced from their source to the food web in the Bay-Delta. Additional research is being planned for spring 2018 that will focus on understanding nutrient conditions and the base of the food web in shallow tidal wetland habitat.

Novel Tools and Approaches to Evaluate Effects of Multiple Stressors — The Delta Science Program, [UC Davis Coastal and Marine Sciences Institute](#), and Water Board hosted a symposium on novel tools and approaches to evaluate effects of contaminants. The symposium discussed the challenges of evaluating and managing contaminants in aquatic ecosystems, novel tools and approaches, and the ecological effects of toxins on aquatic ecosystems. Speakers emphasized the importance of investing in research to inform regulatory decisions about the effects of multiple interactions rather than individual contaminants and provided evidence that contaminants can have population-level effects on aquatic species.

The symposium concluded that contaminants are an important stressor for many aquatic ecosystems, highlighted the value of integrating contaminants research and data sets, and recommended employing and advancing genetic monitoring and analytical tools capable of making scientific predictions about the toxicity of contaminants. Investments and advancements in these areas are expected to leverage existing investigative work concerning contaminants and return improved information for environmental regulators by providing a more complete view of the risks (e.g., sublethal and population-level risks) associated with existing and future contaminants.

13th Biennial State of the San Francisco Estuary Conference (SOE) — SOE was a two-day event hosted by the [San Francisco Estuary Partnership](#), which includes the Council, the [Bay Area Clean Water Agencies](#), and the [California State Coastal Conservancy](#). It showcased the latest science information and management issues for the estuary in a broad sense and incorporated presentations covering the watersheds and Delta, as well as the San Francisco Bay.

The concurrent sessions focused on four major themes: habitats and living resources, climate resilience, water quality, and estuary stewardship. In addition, plenary presentations covered restoration and management challenges moving into the future, engaging elected officials and other leaders on estuarine protection, water reliability, and climate resilience.

A common take-home message from the presentations and discussions at SOE was a sense of urgency to start conservation and restoration efforts sooner rather than later, cautioning that it will become more challenging to implement these efforts in the future.

Delta Science Fellows: 2017 Awards and Early-Career Training — One of the goals of the Council's Delta Science Fellows Program is to partner junior scientists with Delta agency managers and senior research mentors to work collaboratively on research projects and data analyses and syntheses relevant to Delta policy and management. The Council does this in cooperation with the California Sea Grant Program, which offers fellowships in research, natural resource management, and marine policy that allow graduate students, post-graduates, and postdoctoral researchers to explore their interests and broaden their experience.



Council Chair Randy Fiorini discussing how science can best inform policymakers and long-term planning efforts at the SOE Conference. (Council photo)

This year, the Delta Science Program awarded fellowships to eight doctoral students and postdoctoral researchers whose topics included:

- Assessing the effects of extreme events;
- Effectiveness and implications of habitat restoration actions;
- Life histories, habitat requirements, and food webs of Delta estuarine and migratory species in a changing landscape; and
- Science supporting the enhancement and protection of the cultural, recreational, natural resource, and agricultural values of the Delta.

Thus far, the Council has invested more than \$10 million in 80 projects including such topics as new technology and methods for cost-effectively assessing levee vulnerability, and remote sensing of mercury hot spots. In addition, we utilize “State fellows” who work in the offices of the Council to assist with both science and planning components of the agency.



Delta fellows learning from Dr. Peter Moyle (UC Davis) near Putah Creek during the 2017 Early-Career Training Workshop. (Photo by State Fellow Heidi Williams)

The Council has invested more than \$10 million in 80 projects including new technology and methods for cost-effectively assessing levee vulnerability, and remote sensing of mercury hot spots.

Establishing Best Practices After the Drought



California is making progress on several fronts to increase long-term water supply reliability for the State.

Implementation of the [Sustainable Groundwater Management Act](#) (SGMA) is moving forward on schedule, the California Water Commission is evaluating water storage projects so that funding may begin in 2018, the WaterFix passed a major hurdle with release of the Biological Opinions and continued to proceed through other necessary permitting processes, DWR led stakeholder meetings to establish a long-term water conservation framework, and the passage of the Data Act puts the Council's recommendation for an integrated statewide system for water use reporting on a path to realization.

Of the Delta Plan's 25 administrative measures for water supply reliability, five are completed, four have yet to start, and the rest are in varying stages of completion.

Drought restrictions lifted; conservation awareness continues

Storage and conveyance projects move forward

Milestone reached for groundwater sustainability

California's latest drought unofficially ended with historic precipitation in January and February, and [officially ended by declaration of the Governor in April](#) as spring runoff began to fill – and in some cases overflow – reservoirs throughout California.

[Gov. Brown declared a drought emergency in early 2014](#), ordering a statewide 25 percent cut in urban water use. Over the succeeding years Californians overall came close to meeting that target and, in some areas, exceeded it. On the whole, increasingly diversified urban water supplies and drought preparedness programs allowed California to prove resilient in the face of what, by some measures, was the worst drought on record.

Five years of relentlessly sunny winter weather have nevertheless taken a toll. The Sierra Nevada will be streaked for decades with miles of brown swaths of pine trees that the drought weakened for beetles to kill. Years of low river flows pushed imperiled native fish closer to extinction. Hundreds of thousands of acres of farmland went unplanted and Central Valley water tables plunged and farmland sank as growers pumped ever more groundwater to make up for lost surface water deliveries.

Lessons From the Drought

Three key reports were put into production this year that collectively will provide recommendations for future actions based on lessons learned from this latest in the ongoing series of California droughts:

Lessons Learned from Key Management Responses and Associated Science Affecting the Delta – Currently being written by researchers at the [UC Davis Center for Watershed Science](#) in coordination with Delta Science Program staff, this report will concisely synthesize major management actions taken during water years 2014 and 2015 that affected the Delta (chosen because these represent the most severe years of drought). It also will examine how associated science was used in carrying out these actions, identify gaps in knowledge and provide recommendations for additional science and other activities that will help improve future drought response.

Drought Retrospective – This report is being developed by the [Office of Delta Watermaster](#) in coordination with the [Water Board's Division of Water Rights](#). It will analyze both recent and historical actions (1977 to present) taken by the Water Board in response to drought, including discussion of the current enforcement model and how water rights are managed in the Delta. The goals of this report are to improve

transparency of the Water Board's actions so that they are more predictable and water managers can factor them in to their own drought management plans.

State After Action Report – Being prepared by the [Governor's Office of Emergency Services](#), this report will cover actions taken during the Governor's Emergency Proclamation, spanning from Jan. 17, 2014 to April 7, 2017. It will highlight unique activities such as new organizational structures and response mechanisms developed for the drought and share best practices and lessons learned.

Drought Restrictions Lifted but Conservation Awareness Continues

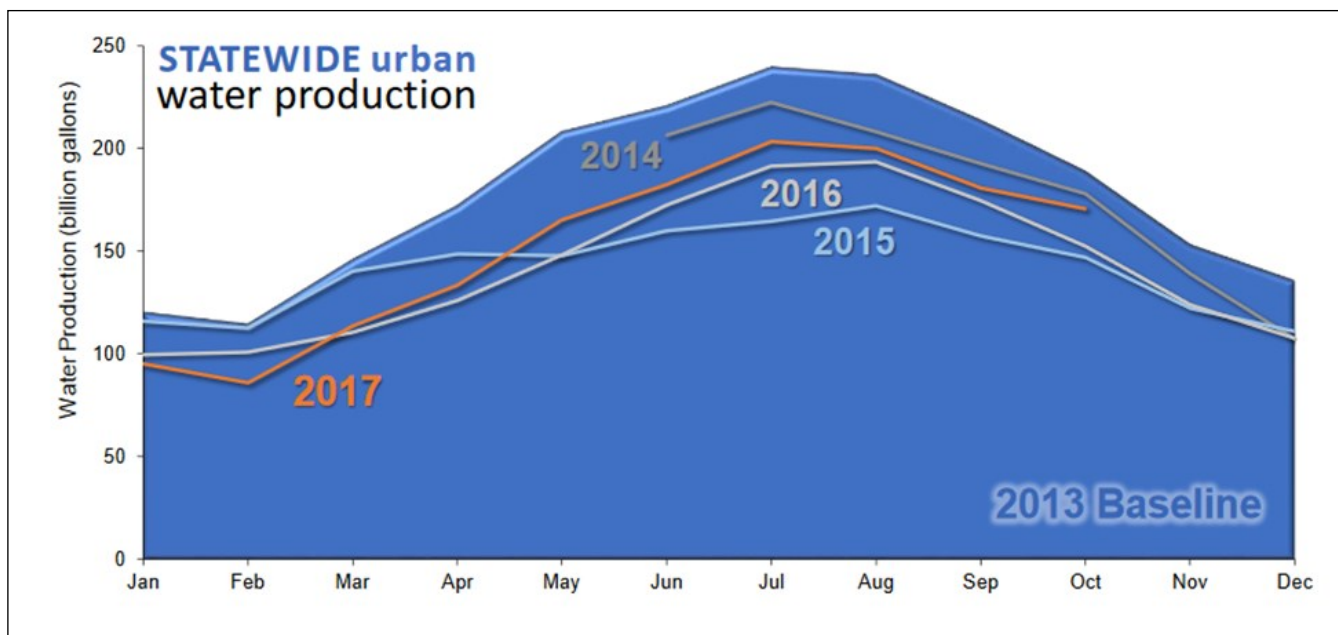
The historic dry spell from 2012 to 2016 prompted many California residents to reduce their water consumption, as did strict regulations imposed by State agencies and individual water districts. In response, urban Californians reduced their water use by about a quarter.

In April 2017, Gov. Brown declared the official end of the drought and mandatory conservation targets were lifted following a very wet winter. Many Californians, however, continue using less water than they did prior to the drought. In Sacramento, Los Angeles, most of the San Francisco Bay Area, and Orange County, urban residential water use is down between 20 and 26 percent since 2013, the benchmark year for pre-drought water consumption by the Water Board.

That said, water conservation is slacking off a bit. In the summer of 2015 – the height of the drought – Californians' water use savings peaked at about 25 percent of 2013 levels. A December report from the Water Board shows statewide savings on urban water use for October 2017 totaled 8.5 percent.



Historic precipitation in January and February brought an official end to the latest drought.



Statewide urban water production, 2013-2017. Source: State Water Resources Control Board.

Aware that some slippage would occur – and that wasteful practices should not resume even with abundant supplies – Gov. Brown issued an executive order setting forth actions to use water more wisely, eliminate water waste, strengthen local drought resilience, and improve agricultural water use efficiency and drought planning.

The order directed the Water Board to permanently prohibit practices that waste water. Proposed new rules were issued in November 2017 for public comment as part of a formal rulemaking process. This rulemaking is part of a broader framework to make conservation a California way of life, a pillar of the California Water Action Plan.

Increasing Storage for Improved Reliability

Given California's periodic fluctuations between drought and flood, the ability to store water when it is plentiful for use when it is not has long driven water policy. For the last 40 years or so, there has also been a growing recognition of the usefulness of storage for environmental as well as water supply purposes.

With this in mind, voters approved [Proposition 1](#) in 2012, which included \$2.7 billion for investments in public benefits of new water storage projects. Following a lengthy public process, the [California Water Commission](#) (Commission) completed regulations for how those public benefits would be weighed and funded through its [Water Storage Investment Program](#) (WSIP) this year. In August, the Commission received 12 applications for review, with funding decisions expected by mid-2018.

The WSIP program should be helpful in the achievement of the coequal goals with the requirements set forth in the programs regulations. The bond act itself required that, at a minimum, 50 percent of requested funding go towards ecosystem improvements. Additionally, the proposed projects must provide measurable improvements to the Delta ecosystem or to the tributaries to the Delta.

Improving Conveyance for Improved Reliability

Scientists and water managers have long been concerned about the biological and water quality effects of moving water across the Delta's waterways to State and federal diversion facilities in the South Delta. WaterFix would upgrade the [State Water Project's](#) Delta water conveyance system to allow at least some water to be taken from the Sacramento River upstream of the Delta and piped to the pumps through twin tunnels. While this proposal has the potential to alleviate current fish entrainment problems in the south Delta, it has also raised concerns over impacts to water quality based on the amount of Sacramento River flow that would be left to flow into the Delta.

This summer the federal agencies responsible for the protection of species listed under the [Endangered Species Act](#) provided biological opinions on the project, concluding that construction and operations of WaterFix as proposed would not jeopardize the continued existence of endangered species in the Delta. Shortly thereafter the DFW issued a corresponding incidental take permit.

While major milestones, these actions are only some of the many regulatory hurdles for the WaterFix project. A Water Board hearing process to determine the effect



A proposed off-stream reservoir near the Sacramento Valley town of Maxwell is one of 11 projects being considered by the California Water Commission. Voters in 2014 approved \$2.6 billion to pay for environmental benefits of increased surface and groundwater storage throughout California.

WaterFix would have on both water rights and the estuarine ecosystems of the Delta, Suisun Marsh, and San Francisco Bay began in the summer of 2016 is not expected to conclude until 2018.

Progress on Groundwater Sustainability

This year California completed the first major step under its SGMA with the formation of local governing agencies, known as [groundwater sustainability agencies](#) (GSAs).

SGMA, a three-bill package signed into law in September 2014, is intended to radically change the way Californians have historically used groundwater. Unlike with surface water supplies, which are carefully allocated through a complex system of water rights, groundwater basins have always been a common resource from which overlying property owners could pump all the water they wanted without reporting their consumption.

This past practice has led to drastic depletion of groundwater basins in areas like the San Joaquin Valley, where land has subsided 20 or more feet because so much water has been pumped from below. The first step was for local agencies to designate a GSA. Local agencies, including counties, cities, and irrigation districts in each basin could jointly form the GSAs. They had until June 30, 2017 to complete the process, and virtually all the basins formed GSAs by the deadline.

Each agency now has five to seven years to adopt a plan that puts the basin on track toward “sustainable management” by roughly 2040. The GSAs are authorized to limit groundwater pumping, monitor water withdrawals, and assess regulatory fees to fund groundwater management and replenishment activities. In enacting SGMA, the California Legislature sought to manage groundwater basins through the actions of local governmental agencies to the greatest extent feasible. If a suitable groundwater sustainability plan is not prepared within the designated timeframes, the Water Board can intervene, adopting and enforcing its own plan.

Groundwater overdraft has caused land to drop in many places in the San Joaquin Valley, causing problems for water supply infrastructure.



Evidence of subsidence was noticed when, at full capacity, water in the Friant-Kern Canal was running up against bridges it would normally pass under quite easily. The picture above shows water passing under the bridge at Road 96 as it likely looked prior to the most recent subsidence. The picture below shows water hitting the bridge at Road 96 under similar flow conditions. ([Friant Water Authority photos](#))



Restoration Progress: Planning and Permitting



The process for updating the [Bay-Delta Plan](#) and establishing new flow objectives for beneficial use has been slow and long overdue. However recent progress has been made.

Since the last revision in 2006, the Water Board has proceeded to separate the update into 4 phases. The SWRCB is currently in Phase 1 and 2, and in September of 2016 a [draft revised Substitute Environmental Document](#) in support of potential Phase 1 amendments to the Bay-Delta Plan was released for public comment.

Of the Delta Plan's 27 administrative measures for ecosystem restoration, two are completed, six have yet to start, and the rest are in varying stages of completion.

Setting foundation for planning beyond a five-year timeframe

Smelt and salmon resiliency strategies show progress

Innovative methodology helps develop carbon market

The Council's Delta Plan directs agencies to restore aquatic habitat and improve water quality while respecting local land uses and expanding opportunities for nature-based recreation and tourism.

The purpose of the BDCP was to provide for the recovery of endangered and sensitive species and their habitats in the Delta in a way that also improved the quality and reliability of water supplies. Begun in 2006, the BDCP identified 22 conservation measures as well as a range of alternatives to improve the way water is moved (conveyed) across the Delta to State and federal water projects.

In the spring of 2015 however, Gov. Brown's administration decided to focus instead on several near-term conservation projects (EcoRestore) and improvements to water conveyance (WaterFix).

Since 2013, there have been significant milestones reached and lessons learned in planning, restoring, and monitoring that provide further insights into the opportunities and challenges for ecosystem restoration in the Delta. For example, major statewide initiatives, such as the [California Water Action Plan](#) (2014) and the Proposition 1 Water Bond (2014) have provided focus and increased funding available for restoration in the Delta. That focus was sharpened further with the creation of EcoRestore.

California EcoRestore

California EcoRestore is an initiative the [California Natural Resources Agency](#) (CNRA) implemented in coordination with State and federal agencies, including the Council, to advance the restoration of at least 30,000 acres of Delta habitat by 2020. It is focused on implementing a comprehensive suite of habitat restoration actions to support the long-term health of the Delta and its native fish and wildlife species. In order to achieve its ambitious restoration targets, EcoRestore is comprised of many projects at various stages of planning, permitting (most), and construction (a few).

One EcoRestore project broke ground this year – the City of West Sacramento's largest levee improvement project to date. This six-mile project in the Southport area includes the setback of an existing levee to provide additional flood capacity and create mixed floodplain and riparian habitat to provide benefits to native fish species. This multi-benefit flood and ecosystem enhancement effort is one of four projects aimed at bringing West Sacramento up to the State-mandated 200-year flood protection level.

Bond Measure Funds Science and Restoration in the Delta

The [Proposition 1 Restoration Grant Program](#) provides two grant programs to meet California Water Action Plan objectives of more reliable water supplies, habitat restoration, and resilient management of water resources: a) The Watershed Restoration Program; and b) The Delta Water Quality and Ecosystem Restoration Grant Program.

From 2015-2025, these two sub-programs will support restoration projects both inside and outside of the Delta with a variety of recipients, such as UC Davis, the California State Coastal Conservancy, and [Ducks Unlimited](#). The Delta Water Quality and Ecosystem Restoration Grant Program also funds scientific studies that address the DPIIC's high-impact science activities and the SAA.

This year, the [Delta Conservancy](#) (Conservancy) approved approximately \$4.4 million in Prop. 1 funding for four projects that restore and enhance ecosystems, improve water quality, and support water-related agricultural sustainability in the Delta. In addition, in 2017 the DFW allocated \$7 million to fund projects through the Delta Water Quality and Ecosystem Restoration Grant Program.

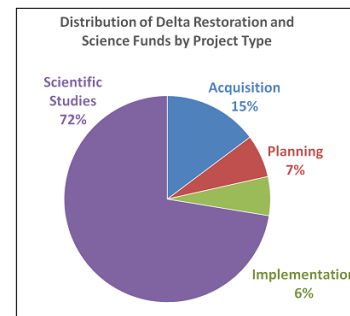
Council staff continues to work with EcoRestore to develop an adaptive management plan for restoration projects under the EcoRestore banner.

Planning Beyond the California EcoRestore Timeline

The Council's planned amendment of the Delta Plan's ecosystem chapter is intended to provide the foundation for restoration beyond the 2020 timeline for EcoRestore. It will consider past and future effects of climate change and sea level rise, incorporate lessons learned about adaptive management of the Delta ecosystem, identify best practices, address needed institutional changes to improve implementation of restoration actions, and be informed by the best available interdisciplinary science.

The amendment is intended to work in concert with a major effort this year also designed to chart a course for the longer term: A [Conservation Framework](#) (Framework) developed by the DFW.

Following a series of public workshops, this year DFW completed a draft of the Framework that includes new implementation and policy guidance in addressing elements of the BDCP that were not included in EcoRestore or WaterFix; guidance for grant making by DFW and others; and a method to inform an ecosystem restoration amendment to the Delta Plan. The Framework's 30-year vision is to achieve a "Delta composed of resilient natural and managed ecosystems, situated within a mosaic of towns and agricultural landscapes where people prosper and healthy wildlife communities thrive."



Source: California EcoRestore

The Council's amendment of the Delta Plan's ecosystem chapter is intended to provide the foundation for restoration beyond the 2020 timeline for EcoRestore.



Although smelt numbers remain low, first-year implementation of the Delta Smelt Resiliency Strategy shows significant progress on 13 actions to create better habitat, more food, and higher turbidity for Delta smelt, along with reduced levels of weeds, predators, and HABs.

Other Accomplishments This Year Include:

Regional Planning – The Cache Slough planning process began in November 2016, bringing together representatives from Solano and Yolo Counties; the Yolo, Solano, and [Dixon Resource Conservation District](#); the [Solano County Water Agency](#); Reclamation District 2068; and several State agencies and consultants. Phase I of this planning effort was completed in early July. The Conservancy is working with project partners to scope Phase II, which will identify Proposition 1 eligible projects through development of an integrated resource management plan for the Cache Slough region.

This process has demonstrated the value of collaborative planning with advanced technology and has greatly improved understanding and relationships among planning participants.

Delta Carbon Methodology – The Conservancy has worked for several years with agencies, landowners, and academics to promote carbon management practices in the Delta to reduce greenhouse gas emissions, curtail subsidence and restore elevations, and increase biodiversity. On April 25, 2017, the [American Carbon Registry](#) (ACR) adopted the [California Wetland Protocol](#) that includes a methodology for managed wetlands and rice cultivation in the Delta and coastal wetlands.

The Conservancy is working closely with several agencies and landowner partners to develop pilot projects that engage the new protocol to demonstrate that revenue can be realized from the voluntary carbon market for these practices. The California Air Resources Board has expressed interest in adopting the protocol into the compliance program provided that the ACR protocol is demonstrating success. The Conservancy intends to use these tools to incentivize land use change to address some of the most challenging threats to the Delta.

Delta Smelt Resiliency Strategy – A progress report on its Delta Smelt Resiliency Strategy issued by the CNRA shows significant progress on 13 actions taken in the past year to create better habitat, more food, and higher turbidity for Delta smelt, along with reduced levels of weeds, predators, and HABs. This Strategy and its various actions are an important step to address the coequal goals in the Bay-Delta.

Sacramento Valley Salmon Resiliency Strategy – This year the CNRA developed a Sacramento Valley Salmon Resiliency Strategy to guide near-term work to recover salmon populations. This Strategy focuses on the freshwater portion of the salmonid life cycle, with emphasis on enhancing spawning and juvenile rearing habitat and eliminating physical barriers to adult migration.

Understanding, Preserving, and Marketing Delta's Heritage

Projects move forward while pushing for Heritage designation

Scientists urge more study of social and natural interactions

New website promotes the Delta

Delta Reform Act recognized the economic and cultural significance of California's Delta, providing an important caveat to achievement of the coequal goals: that they be accomplished in a way that "protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place."

From the water, the Delta is a thicket of sloughs, rock-lined channels, and open waterways plied by recreational boaters and oceangoing freighters, plumbed by on-farm and statewide water diversion structures, and home to multiple species of fish and waterfowl. From the land, it is predominately a rural and agricultural landscape with 11 historic small cities and towns, ringed by growing major metropolitan areas such as Sacramento, Stockton, Tracy, and Fairfield.

Working to Preserve and Market the Delta's Heritage

In 2013, the [Delta Protection Commission](#) (DPC) began a Delta Heritage Area Initiative as a way to advance projects that protect and enhance the Delta as an evolving place and demonstrate the region's capacity for a [National Heritage Area](#) designation.

Although legislation that would establish a Delta National Heritage Area, as recommended in the Delta Plan, continues to not find traction in [Congress](#), the DPC is moving forward on Council-funded efforts to develop projects that will protect and help market the Delta's unique communities as well as cultural and recreational opportunities.



Town of Locke built by Chinese immigrants during the early 20th century.



The Delta Protection Commission (DPC), in partnership with Sacramento and Yolo counties, gathered a team of experts in community development to assist Delta communities in increasing their civic vitality and preserving the values and character of historic Delta towns. [Caltrans](#) is in the process of conducting a vulnerability assessment to identify where the State highway system is vulnerable to the impacts of climate change, with an anticipated completion date of late 2018. Also, the Council is working with the [State Transportation Authority](#) discussing draft policies and recommendations that consider the effects of flood hazards and sea level rise on State highways in the Delta.

Of the Delta Plan's 24 administrative measures for protecting the Delta as an evolving place, three are completed, two have yet to start, and the rest are in varying stages of completion.



A collaboration of agencies and Delta tourism interests resulted in a marketing plan and website to promote the Delta as a destination.

The first phase of this project includes the preparation of feasibility studies to help turn heritage project concepts into more detailed project plans. These plans would include market demand analysis, estimated costs, and organizational and financial actions, all intended to generate additional interest and funding for the Delta Heritage Area from non-profits, businesses, and foundations. Commission staff has recently finalized a contract with a consultant team to develop the feasibility studies.

Delta Signage Improvements

The Council also funded a Conservancy project to increase awareness and improve the resident and visitor experience through [better road signage](#) within the Delta. The Conservancy is currently embarking upon a planning effort with the objective of both improving and adding to current signage (e.g. “Welcome to the Delta”).

Review of Scientific Research on the Delta as an Evolving Place

The Delta Reform Act of 2009 directs the Delta ISB to review science programs in support of adaptive management in the Delta. This year, the Delta ISB completed a [programmatic review of Delta as a place](#), aiming to hasten the development of a working understanding of the supporting social and natural processes.

The review found that research on the social and natural processes of the Delta is sparse and sporadic, with seven research projects and no established research programs. The Delta ISB noted that far more research occurs on other Delta topics, such as water flows, contaminants, nutrients, and at risk species and urged that scientists and Delta agencies act to improve their scientific understanding of the interaction between the Delta’s natural and social processes.



Delta Leadership Program participants learning about the Delta and its related legislation and agencies. (Photo by DPC Information Officer Stacy Hayden)

Blazing a Trail Around and Through the Delta

Planning and development of a regional recreation corridor known as the Great California Delta Trail took a major step forward this year when the DPC approved the Delta Trail designation for 30 miles of existing trail and approximately 20 miles of future trail alignment.

In 2006, the Legislature required the DPC to adopt a plan and implementation program for a continuous recreational corridor trail network through all five Delta counties, linking the San Francisco Bay Trail system to the planned Sacramento River trails in Yolo and Sacramento Counties.

Since then, the DPC has facilitated the trail's planning and feasibility by working with Delta interests, local and regional agencies, and organizations to develop a trail network. Delta Trail designation provides support to public entities when applying for State and federal grant funding opportunities for trails, recreation facilities, and outdoor education improvements.

Growing Leaders from Within the Delta

The DPC, in partnership with the [Delta Regional Foundation](#), created the [Delta Leadership Program](#) as a way to sustain leadership development within the Delta community. Now in its fourth year, this program includes five one-day workshops, with half of each day spent on regional issues such as water and agriculture, public safety, and economic development; and the other half spent on skill development such as negotiation, innovation, team building, values, and organizational momentum.

In addition, the Conservancy, in collaboration with the DPC and a consortium of various tourism interests in the Delta, completed a [Delta Tourism Awareness five-year Marketing Plan](#) and a Delta-centric [tourism website](#) this year. The Marketing Plan is a tool for the Delta community to reference in implementing creative strategies to attract visitors.

The tourism website highlights the many activities and businesses visitors can enjoy while exploring the Delta and can be found at www.visitCAdelta.com.

Using Science and Experience to Manage Flood Risk



Emergency preparedness in the Delta continues to be improved as the recommendations of the Delta Plan and the [Delta Multi-Hazard Coordination Task Force](#) are implemented.

The CVFPP was updated and includes specific recommendations on urban and rural levee improvements and multi-benefit projects, along with approaches to residual risk management including investments in non-structural solutions, floodplain management, and emergency response.

The Council's DLIS, included in a draft amendment to the Delta Plan's current regulatory policies and recommendations, was submitted for environmental review and will likely be adopted in early 2018.

Of the Delta Plan's 25 administrative measures for water supply reliability, four are completed, six have yet to start, and the rest are in varying stages of completion.

Delta Levees Investment Strategy awarded

Central Valley Flood Protection Plan updated

State helps fund levee maintenance and improvements

The series of hurricanes that struck the Gulf Coast this year reinforced a lesson Californians are already putting into practice – flood management is most successful when man-made barriers are integrated with the natural protection of flood plains, and when land-use decisions take into account the threat posed by sea level rise and climate change.

Although hurricanes are unlikely in northern California, the State has a long history of damaging floods from winter rains and spring snowmelt. Climate change projections, which show the likelihood of warmer temperatures, less snowpack and stronger precipitation events, will only serve to put more pressure on the State's levees and floodplains.

Located at the outlet of two major river systems, and with much of its land near or below sea level, the Delta is inherently flood-prone. Delta settlers wrestled these lands from marshes and channels, constructing 1,100 miles of levees with some of the 19th century's best engineering. Constant effort is still required today to reduce the risk of floods that imperil the region's 261,835 residents and the nearly \$36 billion in assets that include farms, businesses, and infrastructure.

The Council's Delta Plan notes that eliminating all flood risk is impossible, but prudent planning, reasonable land development, and improved flood management will significantly reduce that risk and simultaneously contribute to achieving the coequal goals.

Currently, the Delta Plan includes interim priorities for State investment in Delta levees and the Council is now updating those priorities by developing DLIS.

Delta Levees Investment Strategy

The Delta Reform Act of 2009 required the Council to lead a multi-agency effort to update priorities for State investments in the Delta levee system to reduce the likelihood and consequences of levee failures, to protect people, property, and State interests, while advancing the coequal goals of improving water supply reliability, restoring the Delta ecosystem, and protecting and enhancing the values of the Delta as an evolving place.

Over the past two and a half years, the Council has hosted 40 meetings with technical experts including reclamation district engineers, four public workshops, and 27 discussions of the strategy and proposed amendment. The Council approved the proposed amendment for environmental impact review in March and anticipates strategy completion, along with an accompanying report to the Legislature, in 2018.

DLIS combines risk analysis, economics, engineering, and decision-making techniques to identify funding priorities and assemble a comprehensive investment plan for the Delta levees. It uses an innovative computer-based, interactive planning tool to help summarize and visualize current risks without additional levee investments, as well as the risk reduction achieved by potential future levee projects.

In September, the national [Floodplain Management Association](#) presented the Council with an “Award of Excellence,” honoring DLIS for its outstanding floodplain management.

Central Valley Flood Protection Plan

The [Central Valley Flood Protection Act](#) of 2008 required DWR to prepare the CVFPP, and the [Central Valley Flood Protection Board](#) (CVFPB) to adopt it in [2012](#), with updates every five years thereafter. The CVFPP provides a programmatic vision to achieve the goals of improved flood risk management, including reduction in systemwide operations and maintenance burdens, river ecosystem recovery and restoration, improved institutional support, and multi-benefit project implementation.

The [2017 CVFPP update](#) refined the State’s investment approach to flood management, and is founded on in-depth technical studies of [State Plan of Flood Control](#) (SPFC) facilities within the Sacramento and San Joaquin Rivers. Of the 1,100 miles of levees that make up the Delta, approximately two-thirds are the responsibility of local reclamation districts.

The CVFPP includes specific recommendations, including actions within the Delta, on urban and rural levee improvements and multi-benefit projects such as expansions to Yolo Bypass and Paradise Cut. It also provides approaches to residual risk management including investments in non-structural solutions, floodplain management, and emergency response.

Both the DLIS amendment and the CVFPP update attempt to reduce flood risks over the long-term. Both efforts prioritize State investments, promote multi-benefit projects, and enhance the ecosystem; however, the CVFPP is focused on Project levees (levees that the CVFPB has agreed to operate and maintain), while DLIS considers both Project and non-Project levees in the Delta. Approximately two-thirds of the levees in the Delta are non-Project levees, belonging to local districts responsible for their maintenance and operation.

The two efforts share geographic overlap in the north Delta along the Sacramento River and in the south Delta along the San Joaquin and Middle Rivers, and Paradise Cut. The jurisdictional overlap, as well as the hydraulically and ecologically interconnected nature of the system mean that ongoing coordination between these efforts and the partner agencies is crucial.

Improving Residential Flood Protection

The [Small Communities Flood Risk Reduction Program](#) is a cost-share funding program run by DWR that provides local assistance to communities with 200 to 10,000



Levee repairs on Tyler Island in Sacramento County, February 23, 2017. Later that day, Sacramento County officials announced that the evacuation advisory for Tyler Island and the eastern portion of Walnut Grove had been lifted.



Members of the [California Conservation Corps](#) preparing for flood on Twitchell Island in Sacramento County.

residents that are protected by the SPFC. In the Delta, these include Walnut Grove, Isleton, Locke, Clarksburg, Courtland, and Freeport. The program was created as a result of the 2012 CVFPP, and is intended to reduce flood risk for small communities.

Initial funding is being provided to study the feasibility of potential flood risk reduction projects and will be awarded in multiple phases. In April 2017, DWR agreed to fund 35 of 37 proposals (including 10 in the legal Delta) to complete feasibility studies of flood risk reduction projects. Funding for design and construction will be awarded in subsequent phases. These projects must repair, rehabilitate, reconstruct, or replace SPFC facilities (e.g., levees, weirs, bypasses) and be consistent with CVFPP goals and objectives.

Levee Maintenance and Improvements

The [Delta Levees Maintenance Subventions Program](#) is a cost-share program under which DWR and the CVFPB provide technical and financial assistance to local levee maintenance agencies for project or nonproject levees.

The allocated funding for FY 2017-18, is \$12 million. The CVFPB executed 23 work agreements with local levee maintaining agencies for work to support maintenance and rehabilitation activities completed between July 1, 2017 and June 30, 2018. Final claims will not be reconciled until early 2018. Funding for FY 2018-19 also is expected to be \$12 million.

The [Delta Levees Special Projects Program](#) was established in 1988 to ensure protection of local and State interests in the Delta.

Nine projects totaling \$63.3 million were approved in FY 2016-17. These include levee and habitat improvements on Staten, Sherman, New Hope, Bouldin, Palm Orwood, Lower Jones, Woodward, Brannan-Andrus, and Bethel Islands.

The [Urban Flood Risk Reduction Program \(UFRR\)](#) provides [Proposition 1E](#) funding for local agencies to repair, rehabilitate, reconstruct, or replace levees, weirs, bypasses, and facilities of the State Plan of Flood Control; and/or improve or add facilities to the State Plan of Flood Control to increase levels of flood protection for urban areas.

In 2017, the UFRR program committed \$168 million through four cost-share agreements for various projects and studies. The [Early Implementation Program \(EIP\)](#) committed funding in past years to provide flood system improvements in these same areas. EIP and UFRR programs expended a combined \$33.8 million in 2017.

In 2018, the UFRR and EIP programs plan to expend \$105 million in Delta levee facility improvement projects and studies.

2018 Council Priorities

Furthering the coequal goals is an ongoing, Council-led endeavor that requires leadership on multiple and complex issues. Much of our work will be completed with other local, State, and federal agency partners, through greater levels of collaboration and consensus for decision-making based on the best-available science.

Strengthen and Implement the Delta Plan

- Complete amendments to the Delta Plan for Conveyance, Storage, and Operations, the Delta Levees Investment Strategy, and Performance Measures.
- Complete Ecosystem Amendment with environmental review complete in early 2019.
- Evaluate and strengthen Council's regulatory role for Covered Actions.
- Develop climate vulnerability assessment for Delta.
- Improve Council's ability to track and report on Delta Plan performance and implementation.

Enhance Council Leadership and Communications

- Strengthen State-federal agency coordination through the Delta Plan Interagency Implementation Committee.
- Develop a five-year strategic and operations plan.
- Develop communications, outreach, and public participation plan.

Build Capacity for One Delta, One Science

- Complete Delta Science Plan Five-Year Review.
- Sponsor [2018 Bay-Delta Science Conference](#).
- Identify and pursue funding for critical science.
- Develop Adaptive Management forum.
- Finalize Water Supply Adaptive Management Framework and begin implementation plan.
- Lead integrated ecosystem modeling efforts to support decision-making.
- Provide independent peer review, advice, and synthesis services to support State and federal agencies.
- Provide Science-Support for EcoRestore Adaptive Management Program.

